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Title of Invention:

Cosmetic

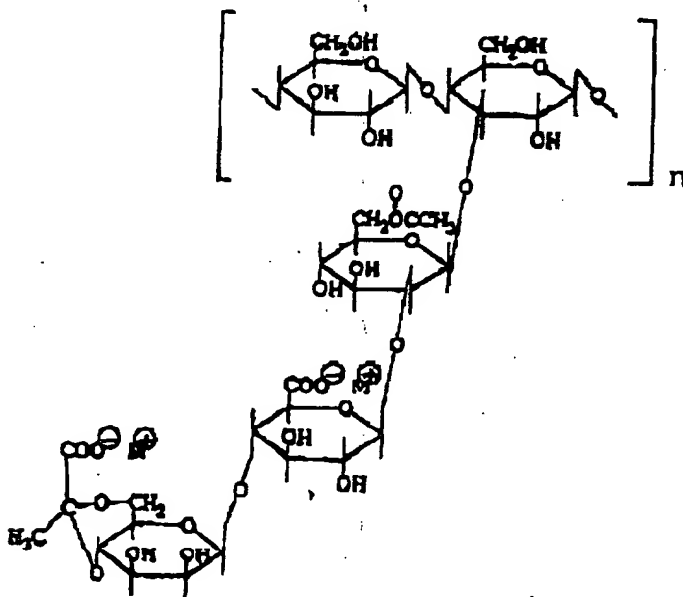
Abstract (with revisions):

Purpose of Invention: To provide a cosmetic with excellent use feel

Make-up of Invention: A cosmetic, characterized in that it contains a xanthan gum the main chain of which is composed of  $\beta$ -(1,4) glucose bonds and the side chain of which is composed of 2 mannose and 1 glucuronic acid; piruvic acid residual groups are bonded to its mannose end and acetyl groups are bonded to the non-terminal mannoses; and its apparent average molecular weight is 16,000,000 or higher.

Claims:

(1) A cosmetic, characterized in that it contains a xanthan gum which is shown by the structural formula below, and its apparent weight average molecular weight is 16,000,000 or higher.



(where M is Na, K, or  $1/2\text{Ca}$ , which may be the same in each structural unit and each position or different, and n is the degree of polymerization)

(2) A cosmetic in accordance with Claim (1) which further contains salts.

(3) A cosmetic in accordance with Claim (1) or (2), in which the salts comprise at least 1 salt selected from L-ascorbic acid inorganic acid ester salts.

#### Detailed Explanation of Invention:

##### Industrial Field of Application

This invention concerns a cosmetic which has excellent stability over time and a good use feel, and which contains a xanthan gum which has a specific high apparent weight average molecular weight.

##### Prior Art

Up to now, various water-soluble polymers have been used in cosmetics in order to impart thickening efficacy, stability, film-forming ability, a good use feel, etc. Xanthan gum, which is a microbial polymer, is a natural polysaccharide formed by the *Xanthomonas* microbes; it has a classic pseudo-plastic flow property such that, when the shear speed is high, its flowability is increased (its apparent viscosity is reduced), and when it is at rest, its flowability decreases (its apparent viscosity increases).

##### Problems That the Invention Is to Solve

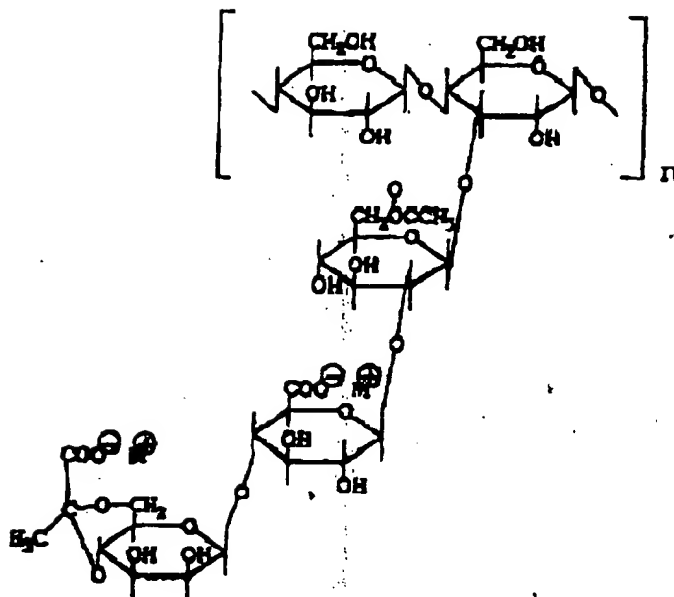
However, conventional xanthan gums had low thickening abilities and insufficient stability-imparting efficacy when compounded in emulsions. Furthermore, when large quantities of them were compounded in order to realize these effects, there was the drawback that a greasy or sticky feeling was produced. Therefore, there has been a desire to develop cosmetics with excellent stability and use feel, without detriment to the properties of the xanthan gum.

##### Means of Solving These Problems

Considering this situation, the inventors performed careful investigations as a result of which they discovered that the problems mentioned above could be solved by using a xanthan gum with a specific molecular weight, and perfected this invention. That is, this invention concerns a cosmetic which is characterized by the fact that it contains a xanthan gum which has the structural formula shown below and has an apparent weight average molecular weight of 16,000,000 or higher.

##### Form of Embodiment of Invention

This invention will be explained in detail below. The xanthan gum used in this invention has a structure which is shown by the structural formula below; its main chain is composed of  $\beta$ (1,4) glucose bonds and its side chain is composed of 2 mannose and 1 glucuronic acid. Piruvic acid residual groups are bonded to the mannose end, and acetyl groups are bonded to the non-terminal mannoses. Its apparent average molecular weight is 16,000,000 or higher.



(where M is Na, K, or 1/2Ca, which may be the same in each structural unit and each position or different, and n is the degree of polymerization)

Since the xanthan gum used in this invention has a cross-linked structure in which many hydroxyl groups contained in the sugar chain are hydrogen-bonded over wide ranges, it has a larger apparent weight average molecular weight than conventional xanthan gums and overall it becomes strongly bonded. If the apparent weight average molecular weight of the xanthan rubber is less than 16,000,000, a sufficient thickening efficacy is not obtained, and a satisfactory effect of imparting stability to emulsified cosmetics cannot be exhibited. Furthermore, the apparent weight average molecular weight (also referred to as "absolute molecular weight") of the xanthan gum, as referred to in this invention, means the value obtained by preparing dilute aqueous solutions of various concentrations, measuring their light scattering and refractive index increases, and performing a Zimm analysis based on the measured values. The measurement limit with this method is about 20,000,000; molecular weights above this are not shown accurately. Furthermore, the reason for the term "apparent" is that it is thought that the structural formula is not changed even by heating; [the molecule] simply becomes entangled and the viscosity increases.

The high-molecular-weight xanthan gum used in this invention can generally be obtained by heating xanthan gum which has a drying decrease (unless otherwise defined below, this means the decrease in quantity when the gum is heated for 5 hours at 105°C under atmospheric pressure) of 50 wt % or less at

100–140°C for 30 minutes or more. The raw material xanthan gum used to produce the high-molecular-weight xanthan gum should have a drying decrease of 50 wt % or less, preferably 20 wt % or less, and especially 15 wt % or less. For this raw material xanthan gum, one can use, first of all, commercial powdered or granulated xanthan gum. One can also use xanthan gum which has been made by liquid-culturing *Xanthomonas campestris* using corn starch or glucose as a carbon source and precipitating differentially from this culture liquid by using a lower alcohol; in this method, the drying decrease during the drying process after the differential precipitation is 50 wt % or less. If the drying decrease of the raw material xanthan gum is greater than 50 wt %, the temperature of the xanthan gum will not rise sufficiently and it will have no effect.

This raw material xanthan gum is heated to produce the high-molecular-weight xanthan gum of this invention; the heating should be performed at 100–140°C, preferably 100–130°C, and especially preferably 105–125°C for 30 minutes or longer, preferably 30 minutes to 10 hours, especially preferably 30 minutes to 7 hours, and still more preferably 30 minutes to 6 hours. Under these conditions, it is preferable to perform the heating for a comparatively short time at the higher temperatures and for a comparatively long time at the lower temperatures. The best heating conditions are 105–125°C for 30 minutes to 6 hours. If the heating temperature is lower than 100°C, the viscosity is not sufficiently improved, and if it is higher than 140°C, there is generally a greater probability of discoloration.

The aforementioned heating can be performed either in a gas or in a liquid. If it is performed in a gas, there is a risk of discoloration if it is performed in the presence of oxygen in the air, etc., so that it is better to perform it in an inert gas which does not react with the xanthan gum. Examples of such inert gases are nitrogen, helium, carbon dioxide, and water vapor. Furthermore, the discoloration can also be avoided by performing the heating in a gas under reduced pressure. The gases which may be used in this case include the aforementioned inert gases, of course, but it is also possible to avoid discoloration even in air by reducing the pressure to a sufficient degree. The degree of pressure reduction is not particularly limited, but a suitable range is 200–0.01 mmHg.

When the heating is performed in a liquid, it is performed in a state in which the xanthan gum is dispersed in an inert solvent which does not dissolve it. When the heating is performed in a liquid, discoloration does not occur. These inert solvents are not particularly limited, as long as they do not dissolve or react with the xanthan gum. Examples of these inert solvents are C<sub>1-6</sub> alcohols, such as methanol, ethanol, n-propanol, isopropanol, n-butanol, n-pentyl alcohol, etc.; C<sub>1-4</sub> alkanediols, such as 1,3-butylene glycol, propylene glycol, ethylene glycol, etc.; ethylene glycol mono- or di-lower-alkyl (C=1–4, especially 1–2) ethers, such as ethylene glycol dimethyl ether, diethylene glycol diethyl ether, ethylene glycol monomethyl ether (methyl Cellosolve), ethylene glycol monoethyl ether (ethyl Cellosolve), etc.; and diethylene glycol mono- or di-lower-alkyl (C=1–4, especially 1–2) ethers, such as diethylene glycol, diethylene glycol dimethyl ether, diethylene glycol diethyl ether, diethylene glycol monomethyl ether, diethylene glycol monoethyl ether, diethylene glycol monobutyl ether, etc. The reaction in inert solvents can be performed under increased pressure, in some cases, e.g., in an autoclave. The isolation of the high-molecular-weight xanthan gum obtained

after the heat treatment may be performed, for example, by filtering the heat-treated liquid, washing the cake, if desired, with a low-boiling-point solvent such as ethanol, and then vacuum-drying it.

The high-molecular-weight xanthan gum produced by the method mentioned above is different from conventional xanthan gums in its high viscosity, as well as the aforementioned high weight average molecular weight. That is, the high-molecular-weight xanthan gum used in this invention, when it has the form of an aqueous solution with a xanthan gum concentration of 0.5 wt %, shows a viscosity of 4000–25000 mPa · s (mPa · s = millipascal x seconds) [measured with a type B viscometer at 6 rpm and 25°C, unless otherwise specified below; furthermore, 1 mPa · sec = 1 cP (centipoise)], preferably 4500–23000 mPa · s, and especially preferably 5000–22000 mPa · s. Since the viscosity of commercial aqueous xanthan gum solutions with a concentration of 0.5 wt % are about 1600–3300 mPa · s, the high viscosity of the high-molecular-weight xanthan gum used in this invention is very remarkable. Furthermore, "Nomucoat Z" (The Nissin Oil Mills, Ltd) is an example of a commercial high-molecular-weight xanthan gum which can be used in this invention.

The quantity of the high-molecular-weight xanthan gum compounded in the cosmetic of this invention is not particularly limited, but it is preferable for it to be 0.01–2 wt %, especially 0.05–1 wt %.

Furthermore, since conventional xanthan gums have low viscosities, when salts were compounded with them, it was not possible to maintain the stability of the system sufficiently, and this imposed limits on the formulations. In contrast, since the high-molecular-weight xanthan gum used in this invention has a cross-linked structure, it shows a high viscosity even in small quantities, and it has the advantage that the stability of the system can be maintained well even when salts are included in the composition, and the drawback of poor feel is not produced. Therefore, it is possible to reduce the restrictions on formulations by compounding the aforementioned xanthan gum with a specific molecular weight, and the intrinsic effects of the salts can be completely exhibited.

Examples of the aforementioned salts are sodium L-ascorbate phosphate, magnesium L-ascorbate phosphate, calcium L-ascorbate phosphate, potassium L-ascorbate phosphate, sodium L-ascorbate sulfate, magnesium L-ascorbate sulfate, potassium L-ascorbate sulfate, calcium L-ascorbate sulfate, sodium pyrrolidone carboxylate, sodium edetate, sodium chloride, potassium chloride, calcium chloride, magnesium chloride, sodium citrate, sodium succinate, sodium carbonate, sodium lactate, calcium lactate, sodium sulfate, potassium sulfate, magnesium sulfate, sodium phosphate, sodium malate, dipotassium glycyrrhetate, zinc paraphenolsulfonate, etc. At least one of these salts may be selected, as suitable. Among them, salts of L-ascorbic acid/inorganic acids, specifically, at least one of the following may be selected: sodium L-ascorbate phosphate, magnesium L-ascorbate phosphate, calcium L-ascorbate phosphate, potassium L-ascorbate phosphate, sodium L-ascorbate sulfate, magnesium L-ascorbate sulfate, potassium L-ascorbate sulfate, and calcium L-ascorbate sulfate. The quantity of these salts compounded is not particularly limited but it is preferably 0.01–5 wt %.

The cosmetic of this invention may contain solid, semi-solid, or liquid oils, water, alcohols, water-soluble polymers, film-forming agents, surface active agents, oil-soluble gelling agents, organic modified clay minerals, resins, powders, ultraviolet ray absorbents, moisture-holding agents, preservatives, antibiotics, fragrances, antioxidants, pH regulating agents, chelating agents, refreshers, anti-inflammatories, skin-beautifying ingredients (whiteners, cell activators, roughness-improving agents, blood circulation promoters, skin astringents, oil leakage preventing agents, etc.), vitamins, amino acids, nucleic acids, hormones, inclusion compounds which are ordinarily used in cosmetics, in ranges which do not hinder the efficacy of the invention.

These ingredients are not particularly limited, but a few examples may be given. For example, examples of oils which can be used are natural animal and plant oils, semisynthetic oils, hydrocarbon oils, higher fatty acids, higher alcohols, ester oils, silicone oils, fluorine oil agents, etc. Examples of these natural animal and plant oils and semisynthetic oils are avocado oil, linseed oil, almond oil, Chinese wax, perilla oil, olive oil, cacao oil, kapok wax, kaya oil, carnauba wax, cod-liver oil, candelilla oil, beef tallow, neat's foot oil, beef marrow oil, hardened beef tallow, apricot kernel oil, spermaceti, hardened oil, wheat germ oil, sesame oil, rice germ oil, rice bran oil, sugar cane wax, sasanqua oil, safflower oil, *shia* butter, Chinese paulownia oil, cinnamon oil, hohoba wax, shellac wax, turtle wax, soy oil, tea seed oil, tsubaki oil, evening primrose oil, corn oil, pork fat, rape-seed oil, Japanese paulownia oil, rice bran wax, germ oil, horse tallow, persic oil, palm oil, palm kernel oil, castor oil, hardened castor oil, castor oil fatty acid methyl ester, sunflower oil, grape oil, bayberry wax, hohoba oil, macademia nut oil, beeswax, mink oil, cotton-seed oil, cotton wax, Japan wax, Japan wax kernel oil, montan wax, coconut oil, hardened coconut oil, *toriyashi* oil fatty acid glyceride, sheep tallow, peanut oil, lanolin, liquid lanolin, reduced lanolin, lanolin alcohol, hardened lanolin, acetic acid lanolin, lanolin fatty acid isopropyl, hexyl laurate, POE lanolin alcohol ether, POE lanolin alcohol acetate, lanolin fatty acid polyethylene glycol ester, POE hydrogenated lanolin alcohol ether, egg yolk oil, etc.

Examples of the hydrocarbon oils are ozokerite, squalane, squalene, ceresin, paraffin, paraffin wax, fluid paraffin, pristane, polyisobutylene, microcrystalline wax, Vaseline, etc. Examples of the higher fatty acids are lauric acid, myristic acid, palmitic acid, stearic acid, behenic acid, undecylenic acid, oleic acid, linolic acid, linolenic acid, arachidonic acid, eicosapentaenic acid (EPA), docosahexaenic acid (DHA), isostearic acid, 12-hydroxystearic acid, etc..

Examples of the higher alcohols are lauryl alcohol, myristic alcohol, palmitic alcohol, stearyl alcohol, behenyl alcohol, hexadecyl alcohol, oleyl alcohol, isostearyl alcohol, hexyl dodecanol, octyldodecanol, cetostearyl alcohol, 2-decyltetradecanol, cholesterol, phytosterol, POE cholesterol ether, monostearyl glycerol ether (varyl alcohol), etc.

Examples of the ester oils are diisobutyl adipate, 2-hexyldecyl adipate, di-2-heptylundecyl adipate, N-alkyl glycol monoisostearate, isocetyl isostearate, trimethyl propane triisostearate, cetyl 2-ethylhexanoate, ethylene glycol di-2-

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ethylhexanoate, neopentyl glycol di-2-ethylhexanoate, trimethylol propane tri-2-ethylhexanoate, pentaerythritol tetra-2-ethylhexanoate, cetyl octanoate, octyldodecyl gum ester, oleyl oleate, octyl dodecyl oleate, decyl oleate, neopentyl glycol dicaprate, triethyl citrate, 2-ethylhexyl succinate, amyl acetate, thyl acetate, butyl acetate, isocetyl stearate, butyl stearate, diisopropyl sebacate, di-2-ethylhexyl sebacate, cetyl lactate, myristyl lactate, isopropyl palmitate, 2-ethylhexyl palmitate, 2-hexyldodecyl palmitate, 2-heptylundecyl palmitate, cholesteryl 12-hydroxystearate, dipentaerythritol fatty acid ester, isopropyl myristate, 2-octyldodecyl myristate, 2-hexyldodecyl myristate, myristyl myristate, hexyldodecyl dimethyloctanoate, ethyl laurate, hexyl laurate, N-lauroyl-L-glutamic acid-2-octyldodecyl ester, diisostearyl malate, etc.

Examples of the glyceride oils are acetoglyceride, triisooctanoic acid glyceride, triisopalmitic acid glyceride, tri-2-ethylhexanoic acid glyceride, monostearic acid glyceride, di-2-heptylundecanoic acid glyceride, trimyristic acid glyceride, etc.

Examples of the silicone oils are higher-alkoxy-modified silicones, such as dimethylpolysiloxane, methylphenyl polysiloxane, methylhydrodiene polysiloxane, octamethyl cyclotetrasiloxane, decamethylcyclopentasiloxane, decamethylcyclohexasiloxane, tetramethyltetrahydrodiene cyclotetrasiloxane, stearoxysilicone, etc.; higher-fatty-acid-ester-modified silicone, higher-fatty-acid-ether-modified silicone, fluorine-modified silicone, silicone resins, silicone rubbers, etc. Examples of the fluorine oil agents are perfluoropolyether, perfluorodecalin, perfluorooctane, etc.

Examples of the alcohols are higher alcohols, such as ethanol, isopropanol, etc.; sugar alcohols, such as sorbitol, maltose, etc.; stearols, such as cholesterol, cytosterol, phytosterol, lanosterol, etc.

Examples of the water-soluble polymers are plant polymers, such as gum Arabic, tragacanth, galactan, carob gum, guar gum, carrageenan, pectin, agar, quince seed (marmelo), starches (rice, corn, potato, wheat), argecoloid, tranth gum, locust bean gum, etc.; microbial polymers, such as xanthan gum, dextran, succinoglucan, pullulan, etc.; animal polymers, such as collagen, caseine, albumin, gelatin, etc.; starch polymers, such as carboxymethyl starch, methylhydroxypropyl starch, etc.; cellulose polymers, such as methyl cellulose, ethyl cellulose, methylhydroxypropyl cellulose, carboxymethyl cellulose, hydroxymethylcellulose, hydroxypropyl cellulose, nitrocellulose, sodium cellulose sulfate, sodium carboxymethyl cellulose, crystalline cellulose, cellulose powder, etc.; alginic acid polymers, such as sodium alginate, propylene glycol alginate, etc.; vinyl polymers, such as polyvinylmethyl ether, carboxyvinyl polymer, etc.; polyoxyethylene polymers; polyoxyethylene-polyoxypropylene copolymers; acrylic polymers, such as poly(sodium acrylate), poly(ethyl acrylate), polyacrylamide, etc.; polyethyleneimine; cation polymers; and inorganic water-soluble polymers, such as bentonite, aluminum magnesium silicate, laponite, hectorite, silicic anhydride, etc. Moreover, film-forming agents such as polyvinyl alcohol and polyvinyl pyrrolidone are also included among these polymers.

Examples of the surface active agents are anionic, cationic, nonionic, and amphoteric ones. Examples of the anionic surface active agents are aliphatic soaps, such as sodium stearate, triethanolamine palmitate, etc.; carboxylic acid

salts, such as alkyl ether carboxylic acids and their salts, condensates of amino acids and fatty acids, etc.; sulfonic acid salts, such as alkylsulfonic acid salts, alkenesulfonic acid salts, fatty acid ester sulfonic acid salts, fatty acid amide sulfonic acid salts, formalin condensates of alkylsulfonic acid salts, etc.; sulfate salts, such as alkyl sulfate salts, secondary higher alcohol sulfate salts, alkyl and aryl ether sulfate salts, fatty acid ester sulfate salts, fatty acid alkylolamide sulfate salts, polyoxyethylene alkyl sulfate salts, Turkey red oil, etc.; and alkyl phosphate salts, ether phosphate salts, alkylaryl ether phosphate salts, amide phosphate salts, N-acylamino acid active agents, etc.

Examples of the cationic surface active agents are amines, such as alkylamine salts, polyamines, amino alcohol fatty acid derivatives, etc.; and alkyl quaternary ammonium salts, aromatic quaternary ammonium salts, pyridium salts, imidazolium salts, etc.

Examples of the nonionic surface active agents are sorbitan fatty acid esters, glycerol fatty acid esters, polyglycerol fatty acid esters, propylene glycol fatty acid esters, polyethylene glycol fatty acid esters, sucrose fatty acid esters, polyoxyethylene alkyl ethers, polyoxypropylene alkyl ethers, polyoxyethylene alkylphenyl ethers, polyoxyethylene fatty acid esters, polyoxyethylene sorbitan fatty acid esters, polyoxyethylene sorbitol fatty acid esters, polyoxyethylene glycerol fatty acid esters, polyoxyethylene propylene glycol fatty acid esters, polyoxyethylene castor oil, polyoxyethylene hardened castor oil, polyoxyethylene phytostanol ether, polyoxyethylene phytosterol ether, polyoxyethylene cholestanol ether, polyoxyethylene cholesteryl ether, polyoxyalkylene-modified organopolysiloxanes, polyoxyalkylene-alkyl-comodified organopolysiloxanes, alkanolamides, sugar ethers, sugar amides, etc. Examples of the amphoteric surface active agents are betaines, aminocarboxylic acid salts, imidazoline derivatives, lecithin, etc.

Examples of the oil-soluble gelling agents are metal soaps, such as aluminum stearate, magnesium stearate, zinc myristate, etc.; amino acid derivatives, such as N-lauroyl-L-glutamic acid,  $\alpha, \gamma$ -di-n-butylamine, etc.; dextrin fatty acid esters, such as dextrin palmitate, dextrin stearate, dextrin 2-ethylhexanoate palmitate, etc.; sucrose fatty acid esters, such as sucrose palmitate, sucrose stearate, etc.; sorbitol benzylidene derivatives, such as monobenzylidene sorbitol, dibenzylidene sorbitol, etc.; and organic modified clay minerals, such as dimethylbenzyl dodecylammonium montmorillonite clay, dimethyldioctadecylammonium montmorillonite clay, etc.

As powders, one can use any ones which are ordinarily used in cosmetics, whatever their forms (spherical, needle-shaped, flat, etc.), granularities (mist, microgranules, pigment grade, etc.), and particle structures (porous, non-porous, etc.). For example, as inorganic powders, one can use titanium oxide, zirconium oxide, zinc oxide, cerium oxide, magnesium oxide, barium sulfate, calcium sulfate, magnesium sulfate, calcium carbonate, magnesium carbonate, talc, synthetic mica, mica, kaolin, sericite, muscovite, red mica, biotite, lithia mica, silicic acid, silicic anhydride, aluminum silicate, magnesium silicate, aluminum magnesium silicate, calcium silicate, barium silicate, strontium silicate, tungstic acid metal salts, hydroxyapatite, vermiculite, *haljiraito*, bentonite, montmorillonite, hectorite, zeolites, ceramics powders, calcium secondary phosphate, alumina, aluminum hydroxide, boron nitride, silica, etc.

As organic powders, one can use polyamide powder, polyester powder, polyethylene powder, polypropylene powder, polystyrene powder, polyurethane, benzoguanamine powder, polymethylbenzoguanamine powder, tetrafluoroethylene powder, polymethyl methacrylate powder, cellulose, silk powder, nylon powder, 12-nylon, 6-nylon, styrene-acrylic acid copolymer, divinylbenzene-styrene copolymer, vinyl resin, urea resin, phenol resin, fluorine resin, silicon resin, acrylic resin, melamine resin, epoxy resin, polycarbonate resin, microcrystalline fiber powder, rice starch, lauroyl lysine, etc. As surface active agent metal salt powders (metal soaps), one can use zinc stearate, aluminum stearate, calcium stearate, magnesium stearate, zinc myristate, magnesium myristate, zinc cetyl phosphate, calcium cetyl phosphate, zinc sodium cetyl phosphate, etc.

As colored pigments, one can use inorganic red pigments, such as iron sulfide, iron hydroxide, iron titanate, etc.; inorganic brown pigments, such as iron oxide, etc.; inorganic yellow pigments, such as yellow iron oxide, loess, etc.; inorganic black pigments, such as black iron oxide, carbon black, etc.; inorganic purple pigments, such as manganic violet, cobalt violet, etc.; inorganic green pigments, such as chromium hydroxide, chromium oxide, cobalt oxide, cobalt titanate, etc.; inorganic blue pigments, such as Prussian blue, ultramarine, etc.; laked tar coloring matters; laked natural coloring matters; composite powders formed from these powders; etc. As tar pigments, one can use titanium-oxide-coated mica, bismuth oxychloride, titanium-oxide-coated bismuth oxychloride, titanium-oxide-coated talc, fish-scale foil, titanium-oxide-coated colored micas, etc.

As metal powder pigments, one can use aluminum powder, copper powder, stainless steel powder, etc. As tar dyes, one can use Red No. 3, Red No. 104, Red No. 106, Red No. 201, Red No. 202, Red No. 204, Red No. 205, Red No. 220, Red No. 226, Red No. 227, Red No. 228, Red No. 230, Red No. 401, Red No. 505, Yellow No. 4, Yellow No. 5, Yellow No. 202, Yellow No. 203, Yellow No. 204, Yellow No. 401, Blue No. 1, Blue No. 2, Blue No. 201, Blue No. 404, Green No. 3, Green No. 201, Green No. 204, Green No. 205, Orange No. 201, Orange No. 203, Orange No. 204, Orange No. 206, and Orange No. 207, etc. As natural dyes, one can use powders selected from carminic acid, laccaic acid, carthamin, brasilin, crocin, etc. One can also use powders made by compounding these powders and ones surface-treated with oils, silicone, or fluorine compounds. If desired, one can use 1 or 2 or more of these.

Examples of the ultraviolet absorbents are benzoic acid ultraviolet absorbents, such as paraaminobenzoic acid; anthranilic acid ultraviolet absorbents, such as methyl anthranilate; salicylic acid ultraviolet absorbents, such as methyl salicylate; cinnamic acid ultraviolet absorbents, such as octyl paramethoxycinnamate; benzophenone ultraviolet absorbents, such as 2,4-dihydroxybenzophenone; urocanic acid ultraviolet absorbents, etc.

As moisture-holding agents, one can use sorbitol, xylitol, propylene glycol, dipropylene glycol, 1,3-butyleneglycol, glycerol, diglycerol, polyethylene glycol, hyaluronic acid, chondroitin sulfate, pyrrolidone carboxylic acid salt, etc.

As preservatives, one can use paraoxybenzoic acid alkyl esters, benzoic acid, sodium benzoate, sorbic acid, potassium sorbate, phenoxyethanol, etc. As

antibiotics, one can use benzoic acid, salicylic acid, carbolic acid, paraoxybenzoic acid esters, parachlorometacresol, hexachlorophene, benzalconium chloride, chlorohexidine chloride, trichlorocarbanilide, photosensitive elements, phenox-yethanol, etc.

As antioxidants, one can use tocopherol, butylhydroXanisole, dibutylhydroxytoluene, etc. As pH regulators, one can use lactic acid, citric acid, glycolic acid, succinic acid, butyric acid, dl-malic acid, potassium carbonate, sodium hydrogencarbonate, ammonium hydrogencarbonate, etc. As chelating agents, one can use alanine, sodium edetate, sodium polyphosphate, sodium metaphosphate, phosphoric acid, etc. As refreshers, one can use L-methanol, camphor, etc. As anti-inflammatories, one can use allantoin, glycyrrhetic acid, tranexamic acid, azulene, etc.

As skin-beautifying ingredients, one can use skin whiteners, such as placental extract liquid, arbutin, glutathione, eichinocystin extract, etc. As cell activators, one can use royal jelly, photosensitive elements, cholesterol derivatives, calf blood extract liquid, etc. As blood circulation promoters, one can use urenylamide nonylate, nicotinic acid benzyl ester, nicotinic acid  $\beta$ -butoxyethyl ester, capsaicin, zingerone, catharistinki, ictamol, caffeine, tannic acid,  $\alpha$ -borneol, nicotinic acid tocopherol, inositol hexanicotinate, cyclandelate, cinnalidine, trazoline, acetylcholine, verapamil, cefalantini,  $\gamma$ -orizanol, etc. As skin astringents, one can use zinc oxide, tannic acid, etc. As oil leakage preventing agents, one can use sulfur, thianthrene, etc.

As vitamins, one can use forms of vitamin A, such as vitamin A oil, retinol, retinol acetate, retinol palmitate; forms of vitamin B<sub>1</sub>, such as riboflavin, riboflavin butyrate, flavinadenine nucleotide, etc.; forms of vitamin B<sub>6</sub>, such as pyridoxine hydrochloride, pyridoxine dioctanoate, etc.; forms of vitamin C, such as L-ascorbic acid, L-ascorbic acid dipalmitic acid ester, etc.; forms of vitamin D, such as pantothenic acid compounds (calcium pantothenate, D-pantothenyl alcohol, pantothenyl ethyl ether, acetyl pantothenyl ethyl ether, etc.), ergocalciferol, cholecalciferol, etc.; nicotinic acid, benzyl nicotinate, nicotinic acid amide, etc.; forms of vitamin E, such as dl- $\alpha$ -tocopherol, dl- $\alpha$ -tocopherol acetate, dl- $\alpha$ -tocopherol nicotinate, dl- $\alpha$ -tocopherol succinate, etc.; vitamin P; biotin, etc.

As amino acids, one can use arginine, aspartic acid, cystine, cysteine, methionine, serine, leucine, tryptophan, etc. As nucleic acids, one can use deoxyribonucleic acid, etc. As hormones, one can use estradiol, ethynylestradiol, etc.

In this invention, the cosmetics include make-up cosmetics, such as foundations, makeup underlayers, rouges, eye shadows, mascaras, eye-liners, eyebrows, overcoating agents, lipsticks, etc.; skin cosmetics, such as toilet water, emulsions, creams, packs, massage materials, lip creams, hand creams, cleansers, etc.; and hair cosmetics. In addition, they include all products which are applied externally to the skin in which feel is considered a problem when they are used, such as externally applied medicines. Moreover, the formulations may be of the oil-in-water type (O/W), such as creams and emulsions, and emulsions of the water-in-oil type (W/O). One can also use oily solid cosmetics, such as lipsticks; lotions, such as toilet water; and other forms which can be carried, such as pastes, gels, powders, etc.



### Working Examples

Working and reference examples of this invention will be given below in order to explain it, but it is not limited by these working examples. In the concentrations in these working examples, "%" refers to "wt %."

#### Reference Example 1: Production of high-molecular-weight xanthan gum

Ten grams xanthan gum powder ("Keltrol," The Neutrasweet Kelco Co., a unit of Monsanto Co.; drying decreases 12 wt %) were heated at 115°C for 3 hours under a vacuum (air, 60 mmHg), and a high-molecular-weight xanthan gum was obtained. A 0.01–0.09% aqueous solution of this high-molecular-weight xanthan gum was prepared, and its light scattering and refractive index increase were measured. A Zimm analysis was performed, and the apparent weight average molecular weight was obtained. The light scattering was performed by using a DSL-7000 (Otsuka Denshi Co.), and the refractive index increase was measured by using a DRM-1030 (Otsuka Denshi Co.). As a result, the apparent weight average molecular weights of the conventional xanthan gum (the aforementioned "Keltrol") was 3,150,000–3,700,000, and that of the aforementioned high-molecular-weight xanthan gum was 20,000,000 or more.

#### Reference Example 2: Measurement of viscosity

0.5, 1.0, 1.5, and 2.0% aqueous solutions of the high-molecular-weight xanthan gum were prepared in Reference Example 1, and their viscosities were measured. The results are shown in Table 1. As is clear from the results obtained, this high-molecular-weight xanthan gum had a higher viscosity than that of the conventional xanthan gum.

Table 1 Comparison of viscosities of xanthan gums

(wt %)	Viscosity [mPas]	
	High-molecular-weight xanthan gum	Conventional (*)
0.5%	5000	1500
* 1.0%	10,000	3000
1.5%	22,000	4800
2.0%	33,000	6000

(\*) Keltrol (The Neutrasweet Kelco Co., a unit of Monsanto Co.)

### Working Example 1 and Comparison Example 1

Emulsions with the compositions shown in Table 2 were produced and their stabilities over time were evaluated.

Table 2

(Ingredients)	Working Example	Comparison Example
	I	1
1. Stearic acid	2.0	2.0
2. Cetyl alcohol	1.5	1.5
3. Vaseline	4.0	4.0
4. Squalane	5.0	5.0
5. Tri-2-ethylhexanoic acid glyceryl	2.0	2.0
6. Sorbitan monooleate	2.0	2.0
7. Dipropylene glycol	7.0	7.0
8. Triethanolamine	1.0	1.0
9. L-ascorbic acid phosphoric acid ester magnesium salt	3.0	3.0
10. Purified water	Remainder	Remainder
11. Xanthan gum (note 1)	0.2	—
12. Xanthan gum (note 2)		0.2
Evaluation Items:		
Stability	No abnormalities	Creaming
Extendability		O
Moist feel		Δ
Lack of clammy feel		x
Lack of sticky feel		x

Note 1: High-molecular-weight xanthan gum produced in Reference Example 1

Note 2: Keltrol (see above)

#### Manufacturing method:

A: Ingredients 8–12 were mixed uniformly and the temperature of the mixture was made 70°C.

B: Ingredients 1–7 were mixed uniformly and the temperature of the mixture was made 70°C.

C: B was added to A and an emulsion mixture was formed; this was cooled and an emulsion was obtained.

### Method of evaluation:

#### 1. Stability

The emulsions prepared as mentioned above were set in a 40°C isothermal tank and their states after 1 month were observed with the naked eye. The results of this evaluation are shown in Table 2.

#### 2. Feel of use

A use test was performed by 20 specialized evaluation panel members, and the samples were evaluated in 5 grades according to the following standards, with respect to their extendabilities when applied, moist feel, and lack of clammy or sticky feels. The samples were judged according to the average scores.

### Evaluation standards:

5 points: extremely good

4 points: good

3 points: ordinary

2 points: rather poor

1 point: poor

### Judgments:

⊙: average score  $\geq 4.5$

○: average score  $\geq 3.5$  and  $< 4.5$

△: average score  $\geq 2.5$  and  $< 3.5$

×: average score  $< 2.5$

The results obtained are shown in Table 2.

As is clear from the results obtained, the emulsion of Working Example 1 of this invention had an excellent stability over time and its use feel was also good. In contrast, creaming (separation) was caused in the emulsion of Comparison Example 1, and it had a clammy, sticky feel, so that its use feel was unsatisfactory.

### Working Example 2 Toilet water

Ingredients	(%)
1. Polyoxyethylene (20) oleyl alcohol	0.5
2. Fragrance	Suitable quantity
3. Ethanol	10.0

4. Dipropylene glycol	6.0
5. Polyethylene glycol	5.0
6. Preservative	Suitable quantity
7. Xanthan gum (prepared in Reference Example 1)	0.05
8. L-ascorbic acid sulfate ester sodium salt	0.5
9. Purified water	Remainder

#### Manufacturing method:

A: Ingredients 4-9 were heated and mixed uniformly and then cooled.

B: Ingredients 1-3 were heated and mixed uniformly; the result was added to A and mixed, to obtain a toilet water. The toilet water obtained had excellent stability and a good use feel.

#### Working Example 3 Cream

Ingredients	(%)
1. Cetyl alcohol	5.0
2. Stearic acid	3.0
3. Vaseline	5.0
4. Squalane	10.0
5. Tri-2-ethylhexanoic acid glyceryl	7.0
6. 1,3-Butylene glycol	5.0
7. Glycerol	5.0
8. Monostearic acid propylene glycol ester	3.0
9. Polyoxyethylene (2) cetyl ether	3.0
10. Fragrance	Suitable quantity
11. Triethanolamide	1.0
12. Xanthan gum (prepared in Reference Example 1)	0.3
13. L-ascorbic acid phosphate ester sodium salt	0.5
14. Purified water	Remainder



**Manufacturing method:**

A: Ingredients 11-14 were heated and mixed uniformly and the temperature of the mixture was made 70°C.

B: Ingredients 1-10 were heated and mixed uniformly and the temperature of the mixture was made 70°C.

C: B was added to A and mixed and emulsified; the result was cooled to obtain a cream.

The cream obtained had excellent stability and a good use feel.

**Working Example 4 Emulsion**

Ingredients	(%)
1. Cetyl alcohol	1.0
2. Beeswax	0.5
3. Vaseline	2.0
4. Squalane	6.0
5. Dimethyl polysiloxane	2.0
6. Polyoxyethylene (10) monooleic acid ester	1.0
7. Monostearic acid glyceryl	1.0
8. Fragrance	Suitable quantity
9. Glycerol	4.0
10. Xanthan gum (prepared in Reference Example 1)	0.15
12. L-ascorbic acid phosphate ester magnesium salt	3.0
13. Purified water	Remainder

**Manufacturing method:**

A: Ingredients 9-13 were heated and mixed uniformly and the temperature of the mixture was made 70°C.

B: Ingredients 1-8 were heated and mixed uniformly and the temperature of the mixture was made 70°C.

C: B was added to A and mixed and emulsified; the result was cooled to obtain an emulsion.

The emulsion obtained had excellent stability and a good use feel.

## Working Example 5 Cleansing gel

Ingredients	(%)
1. Coconut oil fatty acid diethanolamide	1.5
2. Fragrance	Suitable quantity
3. Preservative	Suitable quantity
4. Ethanol	15.0
5. 1,3-Butylene glycol	3.0
6. Glycerol	3.0
7. Xanthan gum (prepared in Reference Example 1)	0.3
8. Sodium pyrrolidone carboxylate	2.0
9. Purified water	Remainder

**Manufacturing method:**

A: Ingredients 5-9 were heated and mixed uniformly and then cooled.

B: Ingredients 1-4 were mixed; this mixture was added to A and mixed with it, to obtain a cleansing gel.

The cleansing gel obtained had excellent stability and a good use feel.

Effects of Invention

As described in detail above, the cosmetic of this invention has good stability over time and excellent use feel, due to the fact that a xanthan gum with a specific high molecular weight is compounded in it.

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